MULTI-ZONE AIRFLOW – OVERVIEW

Description	Require that all operating modes of multi-zone air conditioning systems provide at least 350 cfm per ton in order to obtain credit for adequate airflow. Specify that the 350 cfm per ton must be accomplished without bypassing air from the supply ductwork into the return ductwork. Change the credit for multi-zone air conditioning systems to only be available if they meet the specifications for adequate airflow and air handler fan watt draw. This would apply to Residential New Construction and Air Conditioner Replacements (Alterations) of split system air conditioners. The diagnostic test would determine whether the TXV controls the superheat to within acceptable range and whether the refrigerant charge is correct.
Type of Change	The proposed change is a compliance option. It would clarify the requirements for the adequate airflow and air handler fan watt draw credit. It would require a higher level of performance to qualify for the multi-zone credit. Otherwise there is no change in the way trade-off calculations are made. The proposed change does not modify or expand the scope of the Standards. The Standards documents affected are Residential ACM Chapter 4, Appendix RE; the Residential Manual; as well as compliance forms CF-1R, CF-4R, and CF-6R.
Energy Benefits	Field results have shown that multi-zone systems have been plagued by lower airflow when the units are delivering to less than all the zones. This lowers the air conditioner efficiency. In some cases bypasses are installed to shunt some of the supply air into the return duct system to obtain higher airflow across the evaporator coil. This method lowers the evaporator coil temperature reducing system capacity and efficiency.
Non-Energy Benefits	Low airflow contributes to compressor failure when the evaporator coil becomes iced.
Environmental Impact	The change has only positive potential environmental impact. There is no effect on water consumption. It potentially could improve indoor air quality.
Technology Measures	
Performance Verification	This change clarifies the modes in which the air conditioner must be performance tested and verified to obtain an adequate airflow and air handler fan watt draw credit.
Cost Effectiveness	This is a compliance option.
Analysis Tools	The energy savings and peak benefits can be quantified using the current reference method.

Relationship to Other Measures	This does not impact any other measures.

METHODOLOGY

This change will provide proper airflow for multi-zoned systems that chouse to qualify for the following credits: multi-zone credit, adequate airflow credit, and the air handler fan watt draw credit.

ANALYSIS AND RESULTS

Field data have shown that multi-zoned systems are not performing to their assumed potential with respect to airflow across the evaporator coil.

RECOMMENDATIONS

The ACM Manual would clarify the requirements for meeting the verified adequate airflow compliance credit and the verified fan watt draw credit. The ACM Manual would also specify that the multi-zone credit is dependent upon obtaining the verified adequate airflow and verified fan watt draw credit.

ACM Manual Chapter 4

Zonal Control: An optional capability, described in Chapter 6, allows alternative thermostat schedules to be used for the *Proposed Design* run when the HVAC system meets the requirements for zonal control and has verified adequate airflow and verified air handler fan watt draw less than the default. With zonal control, the building is divided into sleeping and living areas and a separate schedule is used for each area. If the user selects this option the ACM shall use the appropriate alternative schedules based on the user's designations for sleeping and living zones and shall automatically report the use of this optional capability in the *Special Features and Modeling Assumptions* listings in the CF1-R. The setpoints for zonal control are also shown in

John Proctor 7/12/06 12:08 AM
Deleted: Table R4-1

ACM Appendix RE

SEE APPENDIX A OF THIS DOCUMENT.

BIBLIOGRAPHY AND OTHER RESEARCH

These changes are based on the field tests compiled by Chitwood Energy Management and Robert Mowris and Associates.

APPENDICES